044

Pushbutton-Controlled Trimpot ICs

G. Kleine

The DS1809 and DS1869 ICs are electronically controlled trimpots that can be adjusted in 64 linear steps using up and down pushbuttons. Since they hold their settings via built-in EEPROMs when the power is switched off, they can be used in place of mechanical trimpots. Values of 10 kΩ, 50 kΩ and 100 kΩ are available. The supply voltage may lie between +3 V and +5 V or +8 V, respectively. The voltages on the three connections RH, RL and RM may not be more than 0.5 V higher than the supply voltage, nor more than 0.5 V negative.

The up and down pushbuttons are debounced inside the ICs, in order to avoid jumping more than one step at a time. Internal 100-kΩ pull-up resistors simplify the external circuitry for the UC and DC pins. Both button pulses must be applied for at least 1 ms. With the DS1809, the delay between successive button pulses must be at least 0.5 s, while with the DS1869 the delay must be at least 1 s. If a pushbutton is held pressed for longer than the delay time, the IC goes into autorepeat mode, in which the wiper setting moves up or down at the rate of 10 steps per second. This means that it takes at most 7 s to go from one end of the range to the other.

Figure 1 shows the DS1809 in autostore operation. The Schottky diode (BAR42, BAR43, BAT45 or similar) and the 10-μF electrolytic capacitor provide sufficient reserve energy when the power is switched off to allow the current wiper setting to be written to the EEPROM. The manufacturer guarantees 50,000 error-free write cycles, and the EEPROM is only written if the setting is not the same as what is already stored in the EEPROM.

If the STR pin of the DS1809 is held to earth while the supply voltage is switched on, the IC enters the command-initiated storage mode. In this mode, a High pulse at the STR input with a duration of at least 1 μs triggers the storage process. In this case, the wiper setting is not stored when the power is switched off.

The DS1869 automatically stores the wiper setting each time it is changed. Instead of a Store input (STR), it has a digital input (D) on the same pin. This input can be driven by a microcontroller or similar device, and it operates immediately, without any debouncing delay. If it is not used, it may simply be left open.

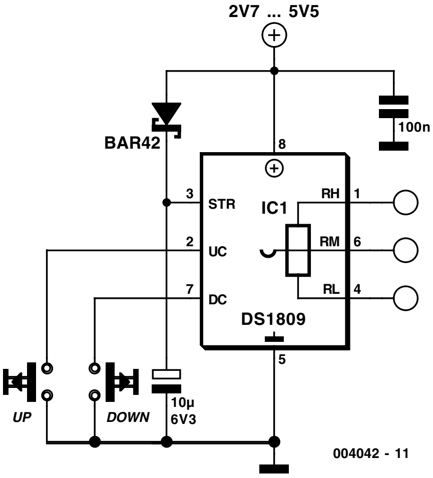
In addition to the two-pushbutton operating mode already described and illustrated in Figure 2a, the DS1869 can also be operated using only one pushbutton, as illustrated in **Figure 2b**. In this case, the 'DC' pin must always be tied to V+, particularly during the switch-on interval. The direction of adjustment reverses after the pushbutton has not been actuated for longer than one second. A series of button pushes separated by less than one second causes the wiper to steadily move in the same direction. If it reaches the end of the adjustment range, it automatically reverses direction.

In this configuration, the autorepeat mode described above is also activated if the pushbutton is held pressed for longer than 1 s, so that the wiper moves automatically at the rate of 10 steps per second. With the DS1869, in contrast to the DS1809, the wiper automatically reverses direction and continues moving in the opposite direction if it reaches the end of the adjustment range.

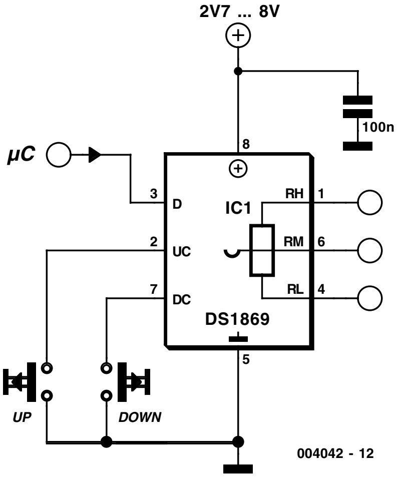
You can download data sheets for these 'Dallastat' ICs from the Internet site *www.dalsemi.com*.

(004042-1)

1



2a



2b